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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/917,911	07/31/2001	Akihiro Muroguchi	WATK:214	1155

7590

01/16/2004

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EXAMINER

OLSEN, KAJ K

ART UNIT

PAPER NUMBER

1753

DATE MAILED: 01/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/917,911

Applicant(s)

MUROGUCHI ET AL.

Examiner

Kaj Olsen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1-9 and 14-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 10-13 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restriction

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-9, drawn to trace oxygen measuring apparatus, classified in class 204, subclass 425.
 - II. Claims 10-13, drawn to method of measuring trace oxygen, classified in class 205, subclass 784.
 - III. Claims 14-17, drawn to device for generating oxygen, classified in class 422, subclass 186.
 - IV. Claim 18-20, drawn to method of generating oxygen, classified in class 205, subclass 628.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus doesn't require first and second air ducts.
3. Inventions IV and III are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process could be performed by a device lacking first and second air ducts.

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4. Inventions (I or II) and (III or IV) are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, inventions III and IV have separate utility such as for an oxygen generator. In addition, inventions I and II could be utilized without any generation of oxygen. See MPEP § 806.05(d).

5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

6. During a telephone conversation with Bob Whelan on 1-7-2004 a provisional election was made with traverse to prosecute the invention of group II, claims 10-13. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-9 and 14-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

7. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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9. Claims 10-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Claim 10 is an incomplete claim because it is drawn to a method of measuring trace oxygen concentration, but doesn't have any step or steps drawn to actually measuring oxygen concentration. The claim only sets forth the presence of a mechanism for measuring oxygen concentration without actually specifying a step of measuring it.

11. In claim 10, it is unclear if the limitation "which corresponds to an oxygen concentration range of at least 2 ppm" is part of the claimed invention or merely a recitation of what the prescribed voltage would provide. Clarification is requested.

12. In claim 10, it is unclear how to interpret the limitation "ensuring followup of Nernst's formula". What is being claimed here?

13. The limitation of claim 10 requiring "feeding oxygen necessary for achieving a set oxygen concentration" is vague. Where is the oxygen being fed from? How is the oxygen being delivered? A process claim should comprise explicit recitations of the step or steps necessary for performing the process.

14. In claim 10, what is the "special oxygen feed air duct"? Shouldn't this be the "first air duct"?

15. In claim 11, there is no antecedent basis for "the oxygen remover" in the limitation beginning "measuring the oxygen concentration...".

16. In claim 11, there is no antecedent basis for "the first measured oxygen pump current" or "the second measured pump current". In addition, the limitations concerning the calculating of a

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difference between the two pump currents are unnecessarily confusing. Applicant appears to be claiming the steps of measuring one pump current and measuring a second pump current after the measured gas in question has passed through an oxygen remover, and determine the oxygen concentration of the measured gas based on the difference between the two currents. However, applicant currently appears to specify determining the difference in currents before the applicant has clearly defined that two currents are being measured. The examiner recommends the applicant amend the claim to better establish the chronology of events.

17. Claim 11 is also confusing because it appears the applicant wishes for the claim to read on embodiments where either one or more than one oxygen sensor is utilized. However, applicant repeatedly refers only to “the oxygen sensor” and not to the or an “at least one oxygen sensor”. Applicant should more clearly define that the first and second current measurements can be performed by one or more than one sensor.

18. Claim 12 is confusing because it is unclear how to interpret the terms “or not” or “the same”. It appears the applicant is specifying an embodiment where there is one sensor and the measurement gas can be switched between going through the oxygen remover and not going through the oxygen remover. This could be more clearly set forth though.

19. Claim 13 has the same confusing chronology problems that claim 11 had. However, if the applicant better defined the first and second current measurements as suggested above, claim 13 could be amended to simply state that two separate oxygen sensors are utilized for each of the first and second current measurements.

Claim Rejections - 35 USC § 103

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

21. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

22. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Usami et al (USP 4,902,400) in view of Logothetis et al (High-Temperature Oxygen Sensors Based on Electrochemical Oxygen Pumping, pp. 136-154).

23. Usami discloses a method of measuring the oxygen concentration of a measurement gas using an oxygen sensor comprising a first air duct 56, a second air duct 20, and a measurement duct 16 defined by a plurality of solid electrolyte layers (fig. 3). The measurement duct of Usami contains an oxygen discharge electrode 6 (i.e. an inner pumping electrode) and a concentration detecting electrode 12 (col. 6, lines 24-37). Usami further discloses an oxygen pump cell formed of an oxygen feed electrode 8 in the first reference duct 56 and the oxygen discharge electrodes (col. 7, lines 41-50), and a concentration detecting cell having an air

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reference electrode 14 formed in the second air duct and the concentration detecting electrode 12 (col. 7, lines 50-62).

24. Although Usami does not clearly lay out how this combination of concentration detection cell and pump cell operate (with particular attention to the use of the feedback control between the concentration detection cell and the pump cell and the use of the current from the pump cell as a measure of the oxygen concentration), Logothetis teaches that this is the conventional manner in which these electrochemical cells (known in the art as “double-cells”) are operated. In particular, Logothetis teaches that the pump current is applied in such a manner that the electromotive force as measured by the concentration detection cell is maintained as a particular prescribed voltage and the resulting pump current becomes the measure of the oxygen concentration. See pp. 145 through 148 and fig. 7. Operating the sensor in this manner would result in a sensor less susceptible to sensor polarization and degradation (p. 145, third paragraph). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Logothetis for the method of Usami in order to operate the sensor in a manner less susceptible to polarization and degradation.

25. With respect to “feeding” the oxygen necessary for the sensor, see Usami, col. 3, lines 28-35.

26. With respect to the level of oxygen in the measuring gas being a “trace” amount, the levels of oxygen in the exhaust gas of Usami (especially in rich exhaust gas (col. 3, lines 28-35)) would read on the term “trace” giving the claim language its broadest reasonable interpretation.

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Allowable Subject Matter

27. Claims 11-13 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

28. The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not disclose nor render obvious all the limitations of claim 11 with particular attention to the use of the specified sensor having first air, second air, and measuring ducts where the oxygen concentration is determined based on a difference between first and second measured pump currents where one of the pump current values comes from a measurement gas that has had the oxygen removed from it.

29. This examiner notes that the European search report indicates that claim 11 is not free of prior art in view of the teachings of JP 10 267892 A and EP 0 797 094 A. However, these references fail to disclose or render obvious the determination of oxygen concentration from the first and second pump currents where one of the pump currents is determined from the measurement gas where oxygen has been removed as required by claim 11. JP '892 teaches removing oxygen from the measurement gas, but not for the purposes of determining a oxygen concentration from two measured pump currents. Moreover, these references don't appear to teach nor render obvious the set forth oxygen sensor having the claimed combination of electrodes and ducts.

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Conclusion

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Gao teaches an alternate sensor possessing a plurality of air ducts. Nachlas discloses an alternate combination of oxygen sensor and oxygen remover.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Thursday from 7:00 AM-4:30 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Mr. Nam Nguyen, can be reached at (571) 272-1342.

When filing a fax in Group 1700, please indicate in the header "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communications with the PTO that are not for entry into the file of this application. This will expedite processing of your papers. The fax number for all official communications is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, whose telephone number is (703) 308-0661.



Kaj K. Olsen
Primary Examiner
AU 1753
January 8, 2004